

1 1. In a system for processing MPEG data in preparation for displaying video
2 images encoded in the MPEG data, a method for subsampling the MPEG data to reduce
3 the volume of video data processed to display the video images, comprising the acts of:

4 processing one or more motion vectors in order to produce coordinates for
5 fetching prediction data from a previously decoded and subsampled reference
6 frame;

7 processing the reference frame and the one or more motion vectors of the
8 MPEG data using a frame prediction module to generate predicted subsampled
9 frame data;

10 processing frequency coefficients of the MPEG data using an inverse
11 discrete cosine transformer (IDCT) to generate IDCT output data;

12 decimating the IDCT output data by a selected factor to generate decimated
13 IDCT output data; and

14 summing the predicted subsampled frame data and the decimated IDCT
15 output data to generate video images encoded in a reduced volume of video data.

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17 2. The method as recited in claim 1, wherein the act of decimating the IDCT
18 output by a selected factor comprises the act of decimating the IDCT output by a factor of
19 two.

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21 3. The method as recited in claim 1, wherein the MPEG data, prior to the act
22 of decimating, is originally formatted for display on a display device with a first video
23 resolution, the method further comprising the act of displaying the generated video images
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on a display device having a second video resolution that is less than the first video resolution.

4. The method as recited in claim 3, wherein:
the display device having the first video resolution is a high definition television; and
the display device having the second video resolution is a standard television.

5. The method as recited in claim 1, further comprising the act of displaying the video images in a window in a picture-in-picture display, the window having a resolution less than a resolution of the MPEG data as the MPEG data existed prior to the act of decimating.

6. A method as recited in claim 1, wherein the act of decimating comprises the act of subsampling the IDCT output data by a first factor in a first direction and by a second factor in a second, perpendicular direction, such that the IDCT output data is decimated by the selected factor.

7. A method as recited in claim 6, wherein the first factor is equal to the second factor.

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8. A method as recited in claim 1, further comprising, after the act of summing, the acts of:

buffering a first frame of the video images in a first frame buffer; and

buffering a second frame of the video images in a second frame buffer,

wherein each of the first frame buffer and the second frame buffer has a data storage capacity that is smaller than that which would be needed to store a frame of the MPEG data prior to decimation.

1 9. In a system for processing MPEG data in preparation for displaying video
2 images encoded in the MPEG data, a method for subsampling the MPEG data to reduce
3 the volume of video data processed to display the video images, comprising the acts of:

4 processing a reference frame and motion vectors of the MPEG data in a
5 frame prediction module to generate predicted frame data;

6 transforming frequency coefficients of the MPEG data to a spatial domain
7 to obtain spatial domain data associated with the MPEG data;

8 subsampling the spatial domain data by a selected factor to generate
9 subsampled spatial domain data; and

10 summing the predicted frame data and the subsampled time domain data to
11 generate video images encoded in a reduced volume of video data; and

12 buffering frames of the video images in frame buffers having a size that is
13 smaller than that which would have been required to buffer frames of the video
14 images if the act of subsampling were not performed.

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16 10. The method as recited in claim 9, wherein the MPEG data, prior to the act
17 of subsampling, is originally formatted for display on a display device with a first video
18 resolution, the method further comprising the act of displaying the generated video images
19 on a display device having a second video resolution, wherein the second video resolution
20 that is lower than first video resolution.

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22 11. The method as recited in claim 10, wherein:

23 the display device having the first video resolution is a high definition
24 television; and

1 the display device having the second video resolution is a standard
2 television.

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4 12. The method as recited in claim 9, further comprising the act of displaying
5 the video images in a window in a picture-in-picture display, the window having a
6 resolution less than a resolution of the MPEG data as the MPEG data existed prior to the
7 act of subsampling.

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9 13. The method as recited in claim 9, wherein the act of processing a reference
10 frame and motion vectors comprises the act of decimating the motion vectors using the
11 selected factor by which the spatial data is subsampled.

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13 14. The method as recited in claim 9, wherein the act of subsampling the spatial
14 data is performed in the vertical direction and comprises the acts of:

15 weighting a color parameter of a first spatial sample using a first weighting
16 factor;

17 weighting a color parameter of a second spatial sample using a second
18 weighting factor; and

19 summing the weighted color parameter of the first spatial sample and the
20 weighted color parameter of the second spatial sample to generate a color
21 parameter of a subsample that corresponds to the first spatial sample and the second
22 spatial sample.

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24 15. The method as recited in claim 14, wherein:

- 1 the MPEG data comprises non-interlaced video data;
- 2 the second spatial sample is immediately vertically adjacent to the first
- 3 spatial sample; and
- 4 the first weighting factor and the second weighting factor are equal.
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- 6 16. The method as recited in claim 14, wherein:
- 7 the MPEG data comprises interlaced video data;
- 8 the first sample and the second sample are vertically adjacent in a field of
- 9 the interlaced video data;
- 10 the first weighting factor is different from the second weighting factor.
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- 12 17. The method as recited in claim 16, wherein:
- 13 the first weighting factor is equal to $\frac{3}{4}$; and
- 14 the second weighting factor is equal to $\frac{1}{4}$.
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1 18. A computer program product for implementing, in a system for processing
2 MPEG data in preparation for displaying video images encoded in the MPEG data, a
3 method for subsampling the MPEG data to reduce the volume of video data processed to
4 display the video images, the computer program product comprising:

5 a computer-readable medium carrying computer-executable instructions,
6 that when executed at the system, cause the system to perform the acts of:

7 processing one or more motion vectors in order to produce
8 coordinates for fetching prediction data from a previously decoded and
9 subsampled reference frame;

10 processing the reference frame and the one or more motion vectors
11 of the MPEG data using a frame prediction module to generate predicted
12 subsampled frame data;

13 processing frequency coefficients of the MPEG data using an
14 inverse discrete cosine transformer (IDCT) to generate IDCT output data;

15 decimating the IDCT output data by a selected factor to generate
16 decimated IDCT output data; and

17 summing the subsampled predicted frame data and the decimated
18 IDCT output data to generate video images encoded in a reduced volume of
19 video data.

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21 19. The computer program product as recited in claim 18, wherein the act of
22 decimating the IDCT output by a selected factor comprises the act of decimating the IDCT
23 output by a first factor in a first direction and a second factor in a second perpendicular
24 direction, such that the IDCT output is decimated by the selected factor.

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2 20. The computer program product as recited in claim 18, further comprising
3 the act of identifying the selected factor, the selected factor being identified to reduce the
4 volume of MPEG data that is to be processed to display the video images and to retain
5 enough video data to display the video images at a video resolution that is supported by a
6 display device associated with said system.

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8 21. The computer program product as recited in claim 18, wherein the MPEG
9 data, prior to the act of decimating, is originally formatted for display on a display device
10 with a first video resolution, the computer-executable instructions, when executed at the
11 system, further causing the system to perform the act of displaying the generated video
12 images on a display device having a second video resolution that is less than the first video
13 resolution.

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15 22. The computer program product as recited in claim 21, wherein:
16 the display device having the first video resolution is a high definition
17 television; and
18 the display device having the second video resolution is a standard
19 television.

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21 23. The computer program product as recited in claim 18, wherein the
22 computer-executable instructions, when executed at the system, further cause the system to
23 perform the act of displaying the video images in a window in a picture-in-picture display,
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the window having a resolution less than a resolution of the MPEG data as the MPEG data
existed prior to the act of decimating.